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SH7043 Series
FP-144
User System Interface Cable
(HS7043ECH61H)
for E6000 Emulator

User's Manual

ADE-702-336

Rev. 1.0
07/08/02
Hitachi, Ltd.

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• READ this user's manual before using this user system interface cable.

• KEEP the user's manual handy for future reference.

Do not attempt to use the user system interface cable until you fully understand its mechanism.

User System Interface Cable:

Throughout this document, the term "user system interface cable" shall be defined as the following product produced only by Hitachi, Ltd. excluding all subsidiary products.

- User system interface cable (HS7043ECH61H)

The user system or a host computer is not included in this definition.

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This user system interface cable is for connecting the emulator station and user system. This user system interface cable must only be used for the above purpose.

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Some figures in this user's manual may show items different from your actual system.

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Hitachi cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the user system interface cable are therefore not all inclusive. Therefore, you must use the user system interface cable safely at your own risk.

SAFETY PAGE

READ FIRST

• READ this user's manual before using this user system interface cable.

• KEEP the user's manual handy for future reference.

Do not attempt to use the user system interface cable until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Do not repair or remodel the emulator product by yourself for electric shock prevention and quality assurance.**
2. **Always switch OFF the E6000 emulator and user system before connecting or disconnecting any CABLES or PARTS.**
3. **Always before connecting any CABLES, make sure that pin 1 on both sides are correctly aligned.**

Preface

Thank you for purchasing this user system interface cable (HS7043ECH61H) for the Hitachi's original microcomputer SH7040 series.

The HS7043ECH61H is a user system interface cable that connects an SH7040 series E6000 emulator (HS7040EPI60H; hereinafter referred to as the emulator) to the IC socket for a FP-144 package for the SH7040 series MCU on the user system.

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Section 1 Configuration

CAUTION

Use an NQPACK144SD socket (manufactured by Tokyo Eletech Corporation) for the FP-144 package IC socket on the user system.

Figure 1 shows the configuration of the HS7043ECH61H user system interface cable for the FP-144 package.

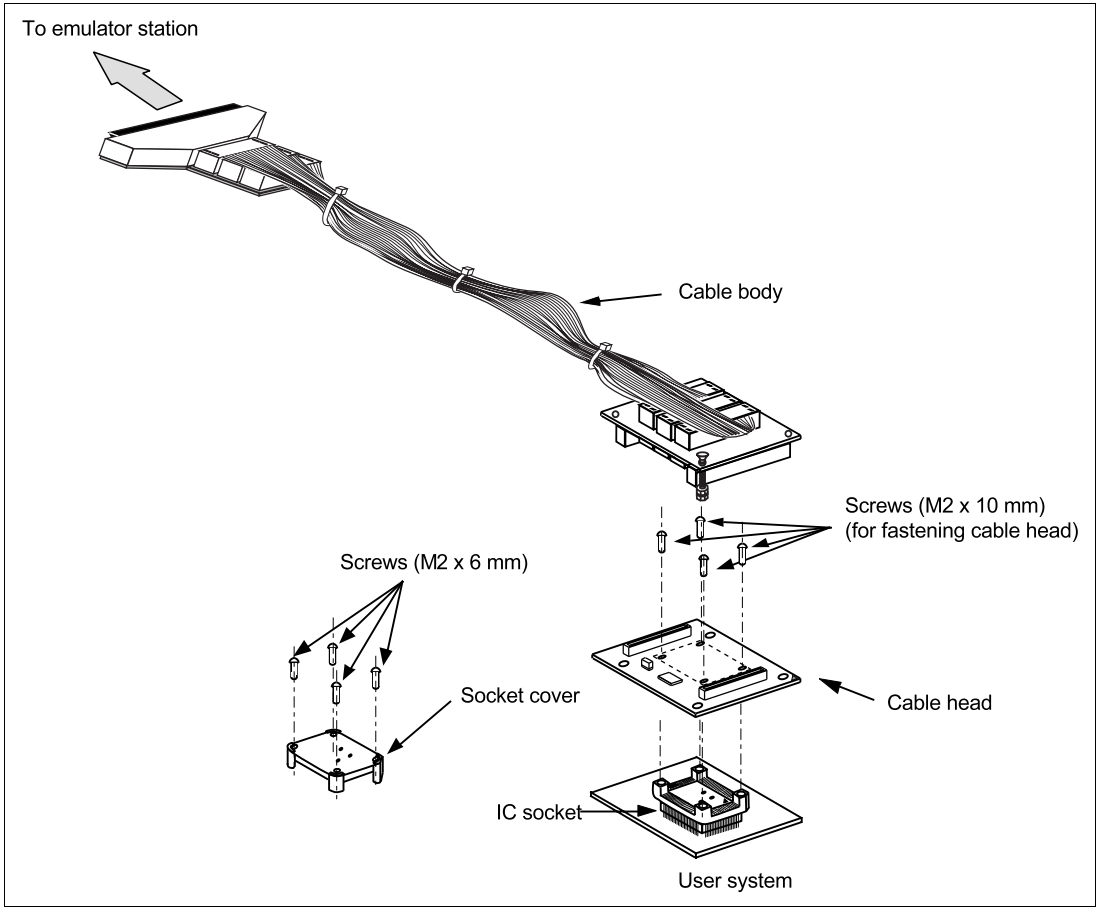

Figure 1 HS7043ECH61H User System Interface Cable

Table 1 lists the HS7043ECH61H components. Please make sure you have all of these components when unpacking.

Table 1 HS7043ECH61H Components

No.	Component	Quantity	Remarks
1	Cable body	1	Includes flat cables
2	Cable head	1	
3	IC socket	1	For the FP-144 package
4	Socket cover	1	For installing an FP-144 packaged MCU
5	Screws (M2 x 10 mm)	4	For fastening cable head
6	Screws (M2 x 6 mm)	4	For installing an FP-144 packaged MCU
7	Guide pins (ϕ 1 mm)	3	For determining the IC socket location
8	Screwdriver	1	For tightening screws
9	Documentation	1	User's manual for HS7043ECH61H (this manual)

Section 2 Connection Procedures

2.1 Connecting User System Interface Cable to Emulator Station

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE CABLE is connected to or removed from any part. Before connecting, make sure that pin 1 on both sides are correctly aligned.**
2. **The user system interface cable dedicated to the emulator must be used.**

To connect the cable body to the emulator station, follow the instructions below.

1. Make sure the user system and emulator station are turned off.

CAUTION

When connecting or removing the user system interface cable, apply force only in the direction suitable for connection or removal, while making sure not to bend or twist the cable or connectors. Otherwise, the connectors will be damaged.

2. After making sure the direction of the cable body connector is correct, firmly insert the cable body connector into the emulator station socket (figure 2).

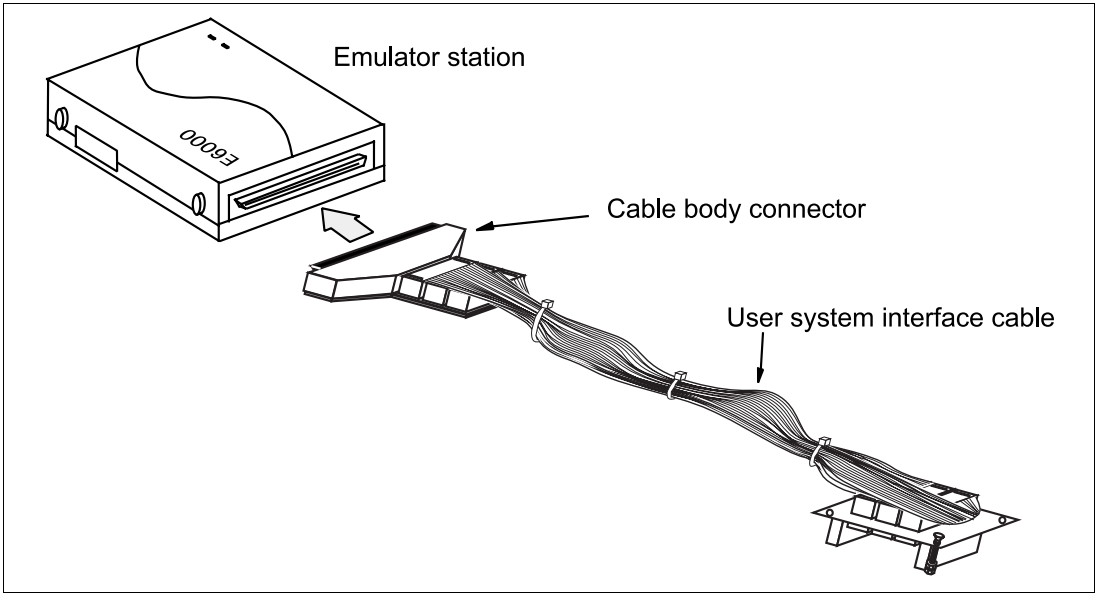

Figure 2 Connecting User System Interface Cable to Emulator Station

2.2 Connecting User System Interface Cable to User System

⚠ WARNING

Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE CABLE is connected to or removed from any part. Before connecting, make sure that pin 1 on both sides are correctly aligned. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

To connect the cable head to the user system, follow the instructions below.

2.2.1 Installing IC Socket

After checking the location of pin 1 on the IC socket fasten it to the user system before soldering.

CAUTION

After confirming the location of pin 1 on the IC socket, apply epoxy resin adhesive to the end of the four projections at the bottom of the IC socket, and fasten it to the user system.

Use the guide pins provided to determine where to install the IC socket, as shown in figure 3.

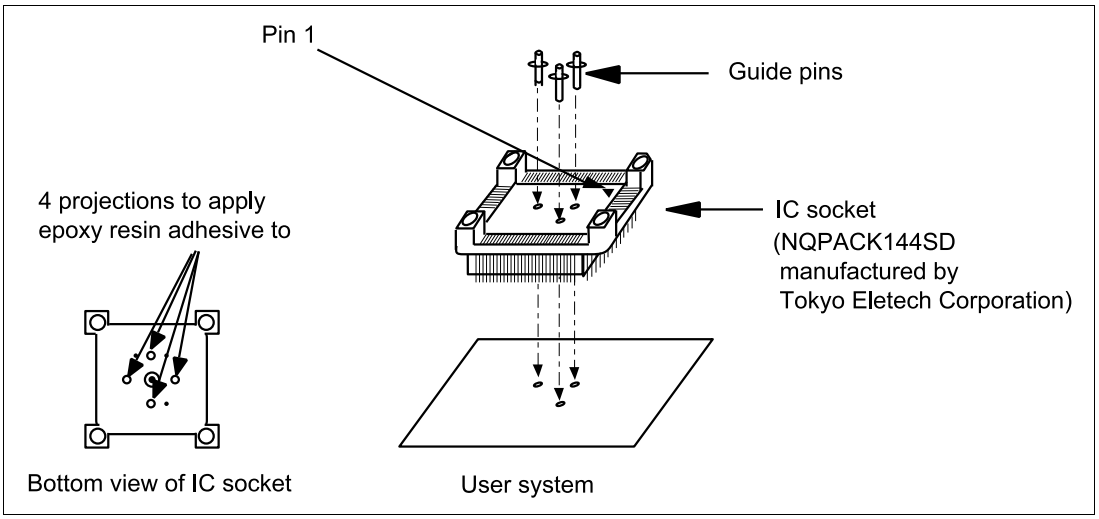

Figure 3 Location Setting of IC Socket

2.2.2 Soldering IC Socket

After fastening, solder the IC socket for an FP-144 package to the user system. Be sure to completely solder the leads so that the solder slops gently over the leads and forms solder fillets. (Use slightly more solder than the MCU.)

2.2.3 Inserting Cable Head

CAUTION

Check the location of pin 1 before inserting.

Align pin 1 on the IC socket for an FP-144 package on the user system with pin 1 on the user system interface cable head, and insert the user system interface cable head into the IC socket on the user system, as shown in figure 4.

2.2.4 Fastening Cable Head

CAUTION

1. **Use the screwdriver provided for tightening screws.**
2. **The tightening torque must be 0.054 N•m or less. If the applied torque cannot be accurately measured, stop tightening when the force required to turn the screw becomes significantly greater than that needed when first tightening. If a screw is tightened too much, the screw head may break or an IC socket contact error may be caused by a crack in the IC socket solder.**
3. **If the emulator does not operate correctly, cracks might have occurred in the solder. Check conduction with a tester and re-solder the IC socket if necessary.**

Fasten the user system interface cable head to the IC socket for an FP-144 package on the user system with the four screws (M2 x 10 mm) provided. Each screw should be tightened a little at a time, alternating between screws on opposing corners. Take special care, such as manually securing the IC socket soldered area, to prevent the soldered IC socket from being damaged by overtightening the screws or twisting the components.

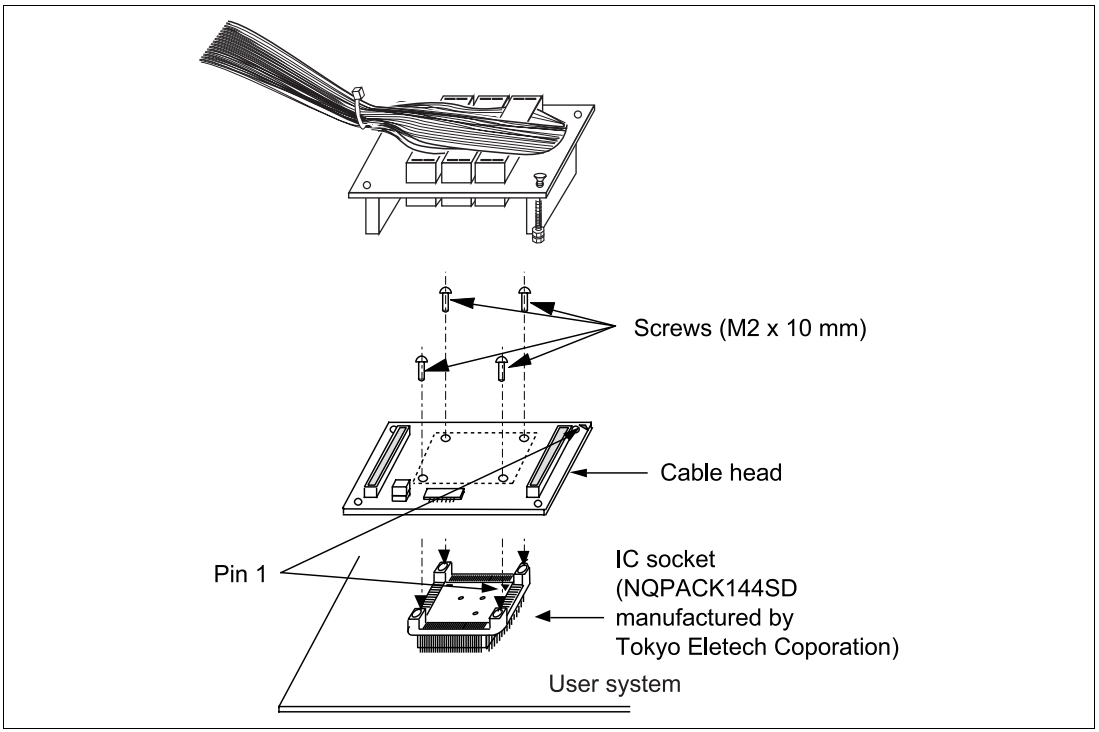

Figure 4 Connecting User System Interface Cable to User System

2.2.5 Fastening Cable Body

Connect the cable body to the cable head.

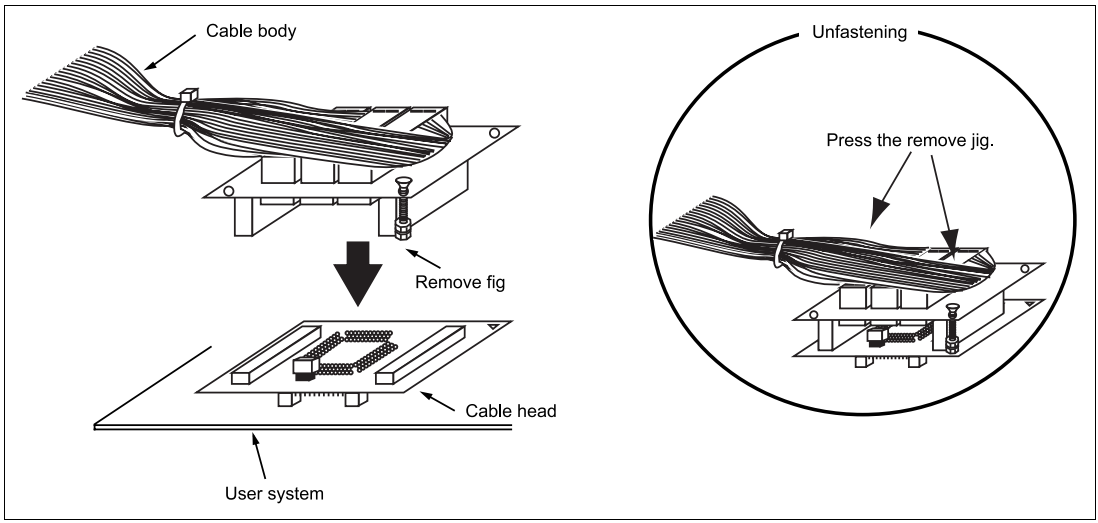

Figure 5 Fastening Cable Body

2.3 Recommended Dimensions for User System Mount Pad

Figure 6 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for an FP-144 package (NQPACK144SD: manufactured by Tokyo Eletech Corporation). Note that the dimensions in figure 6 are somewhat different from those of the actual chip's mount pad.

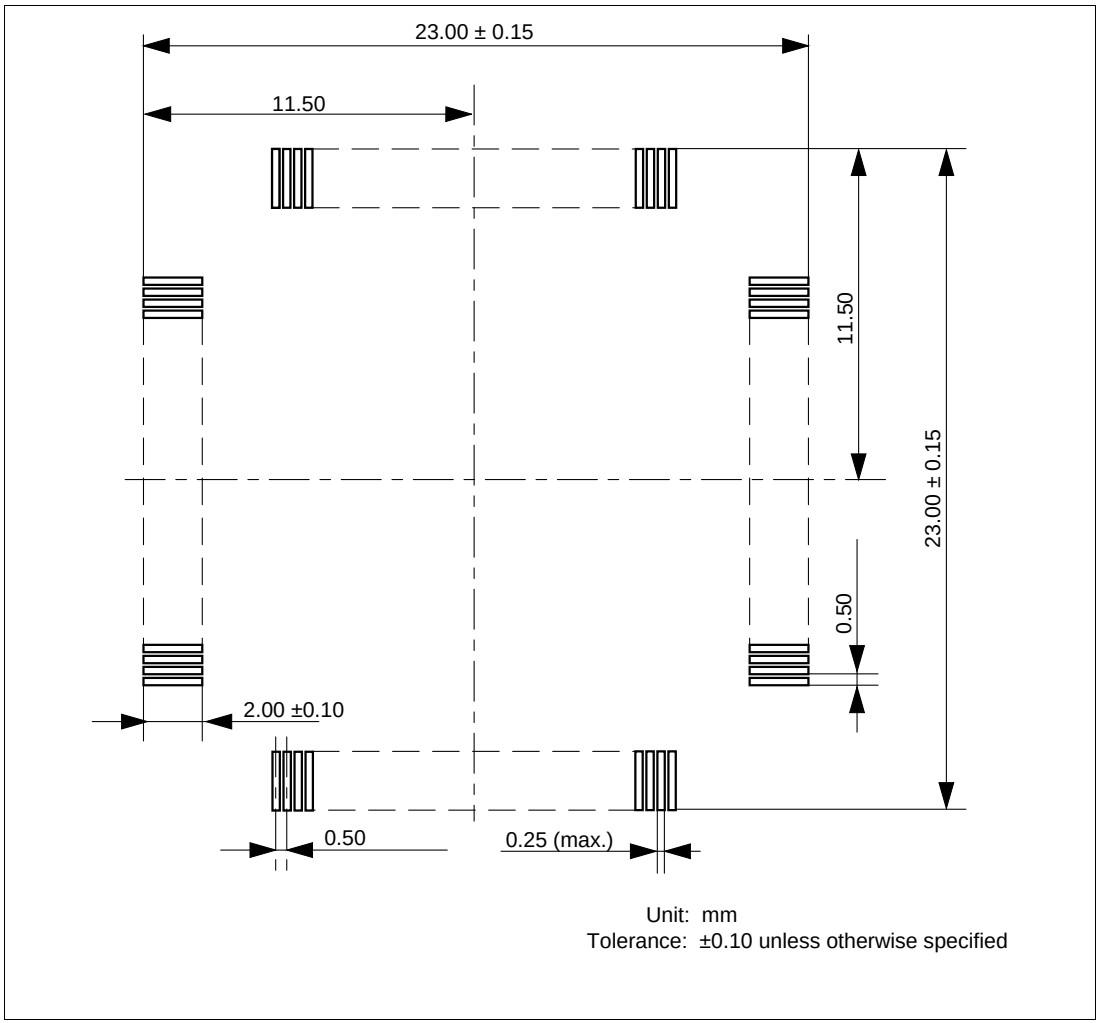

Figure 6 Recommended Dimensions for Mount Pad

2.4 Dimensions for User System Interface Cable Head

The dimensions for the user system interface cable head are shown in figure 7.

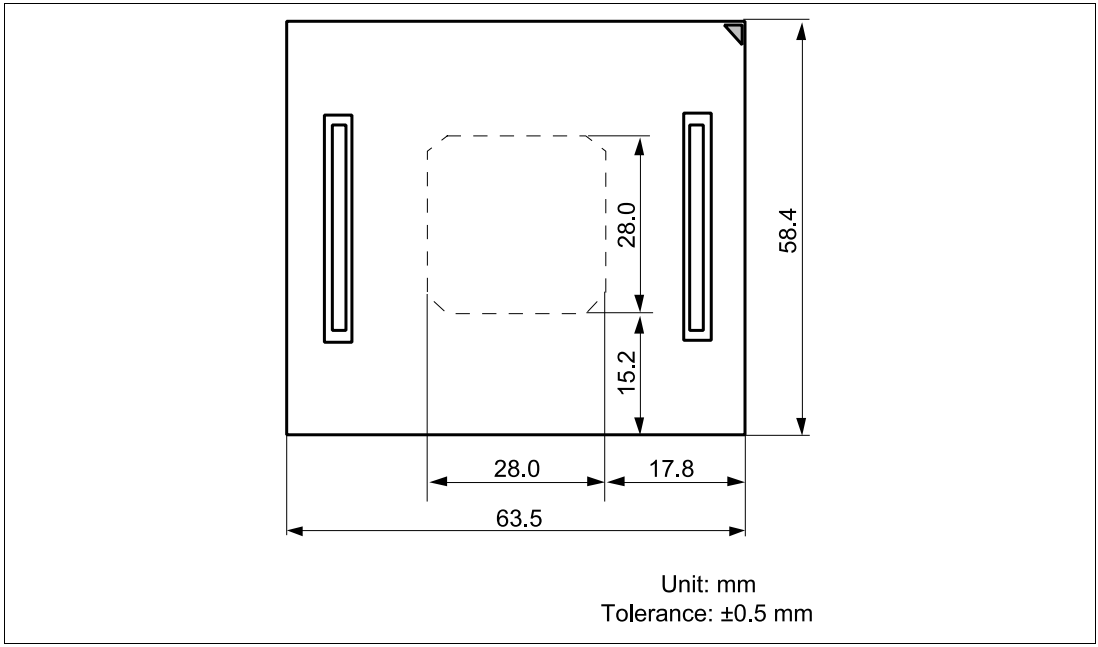

Figure 7 Dimensions for User System Interface Cable Head

2.5 Resulting Dimensions after Connecting User System Interface Cable

The resulting dimensions, after connecting the user system interface cable head to the user system, are shown in figure 8.

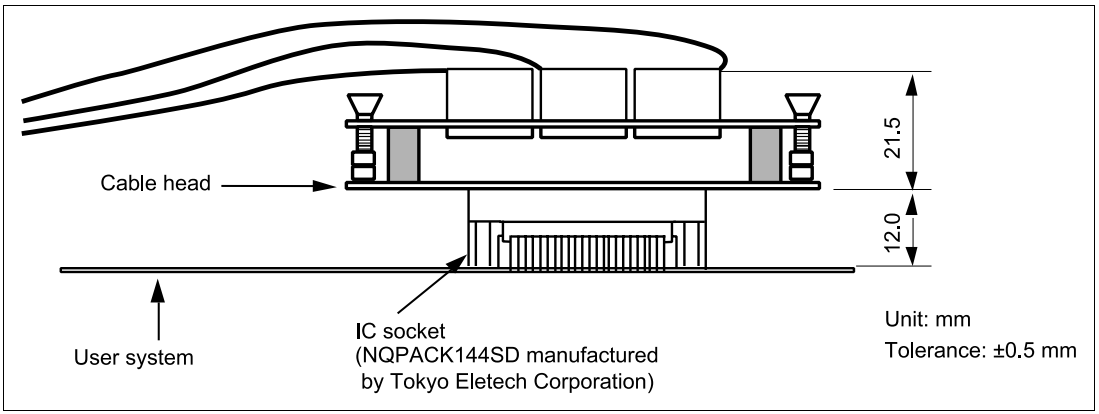

Figure 8 Resulting Dimensions after Connecting User System Interface Cable

Section 3 Installing the MCU to the User System

CAUTION

1. **Check the location of pin 1 before inserting.**
2. **Use the screwdriver provided for tightening screws.**
3. **The tightening torque must be 0.054 N•m or less. If the applied torque cannot be accurately measured, stop tightening when the force required to turn the screw becomes significantly greater than that needed when first tightening. If a screw is tightened too much, the screw head may break or an IC socket contact error may be caused by a crack in the IC socket solder.**
4. **If the MCU does not operate correctly, cracks might have occurred in the solder. Check conduction with a tester and re-solder the IC socket if necessary.**

Check the location of pin 1 before inserting the MCU into the IC socket on the user system, as shown in figure 9. After inserting the MCU, fasten the socket cover with the provided four screws (M2 x 6 mm). Take special care, such as manually securing the IC socket soldered area, to prevent the IC socket from being damaged by overtightening the screws or twisting the components.

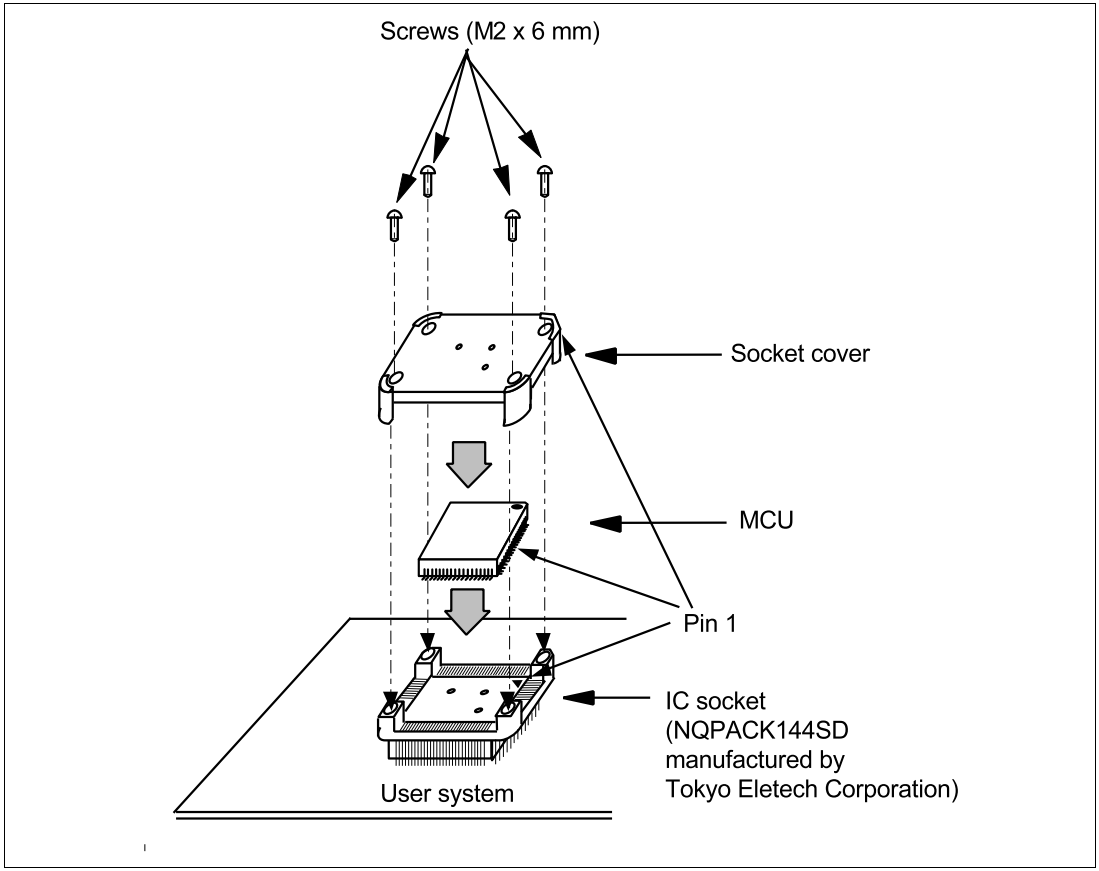

Figure 9 Installing MCU to User System

Section 4 Verifying Operation

1. When using the E6000 emulator for the SH series, turn on the emulator according to the procedures described in the SH Series E6000 Emulator User's Manual (HS7000EPI60HE).
2. Verify the user system interface cable connections by accessing the external memory and ports to check the bus states of the pins with the MEMORY_FILL command (emulator command). If an error is detected, recheck the soldered IC socket and the location of pin 1.
3. The emulator connected to this user system interface cable supports two kinds of clock sources as the MCU clock: an emulator internal clock and an external clock on the user system. For details, refer to the Emulator Supplementary Information (HS7040EPI60HE).
   - To use the emulator internal clock
     Select the clock in the emulator station as the system clock (ϕ), by using the CLOCK command (emulator command).
   - To use the external clock on the user system
     Select the target clock (Target) as the system clock (ϕ), by using the CLOCK command (emulator command). Supply the external clock from the user system to the emulator by inputting the external clock from the EXTAL terminal (pin 96) on the cable head (operates at 4 to10 MHz) or connecting a crystal oscillator to the EXTAL and XTAL terminals (the frequency must be 4 to 10 MHz). For details, refer to section 4, Clock Pulse Generator (CPG), in the SH7040 Series Hardware Manual.

     Figure 10 shows the oscillator circuit on the user system interface cable.

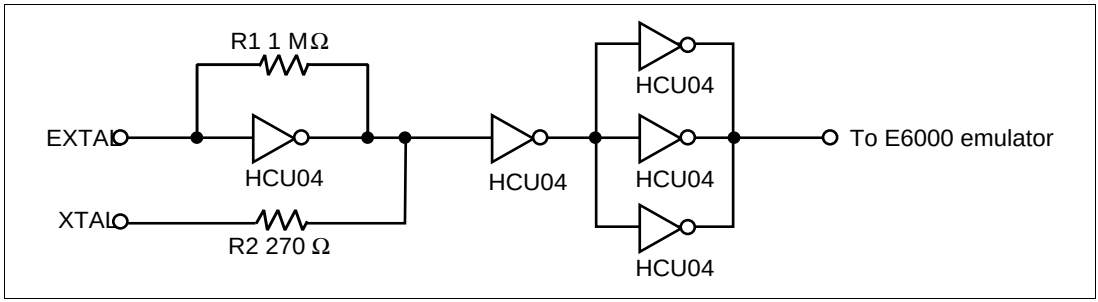

Figure 10 System Clock Oscillator

Section 5 Notice

1. Make sure that pin 1 on the user system IC socket is correctly aligned with pin 1 on the cable head before inserting the cable head into the user system IC socket.
2. The dimensions of the recommended mount pad for the user system IC socket are different from those of the MCU.
3. This user system interface cable is specifically designed for the HS7040EPI60H emulator. Do not use this cable with any other emulator station.
4. To prevent breaking of wires in the cable body, do not place heavy or sharp metal objects on the user system interface cable.
5. While the emulator station is connected to the user system with the user system interface cable, force must not be applied to the cable head. Place the emulator station, user system interface cable, and user system as shown in the example in figure 11.

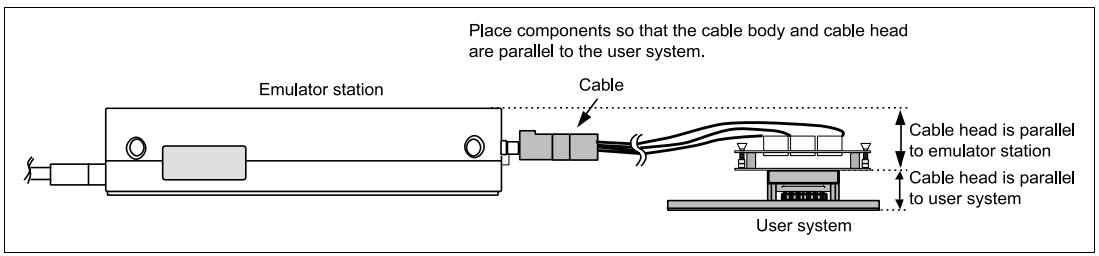
Place components so that the cable body and cable head are parallel to the user system.
Emulator station
Cable
Cable head is parallel to emulator station
Cable head is parallel to user system
User system

Figure 11 User System Interface Cable Location Example

6. The JP1 jumper connector is used for testing. Do not remove the inserted jumper pin.

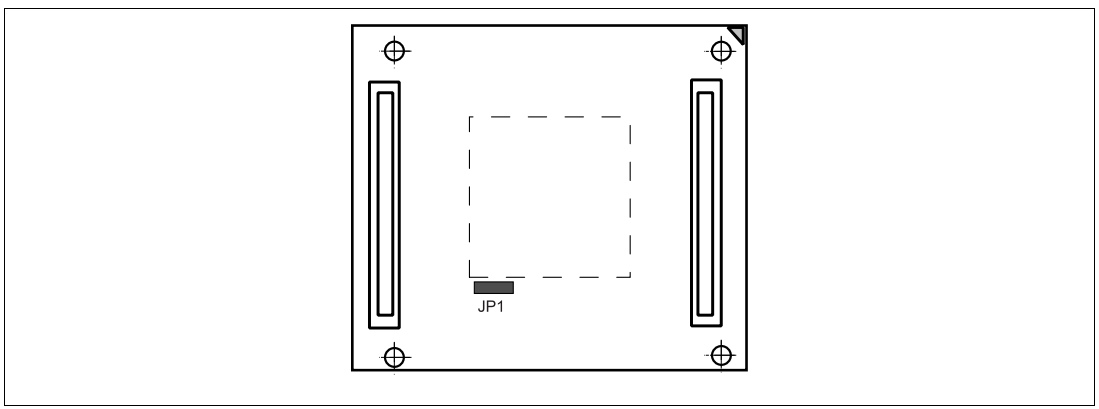

Figure 12 Jumper Connector